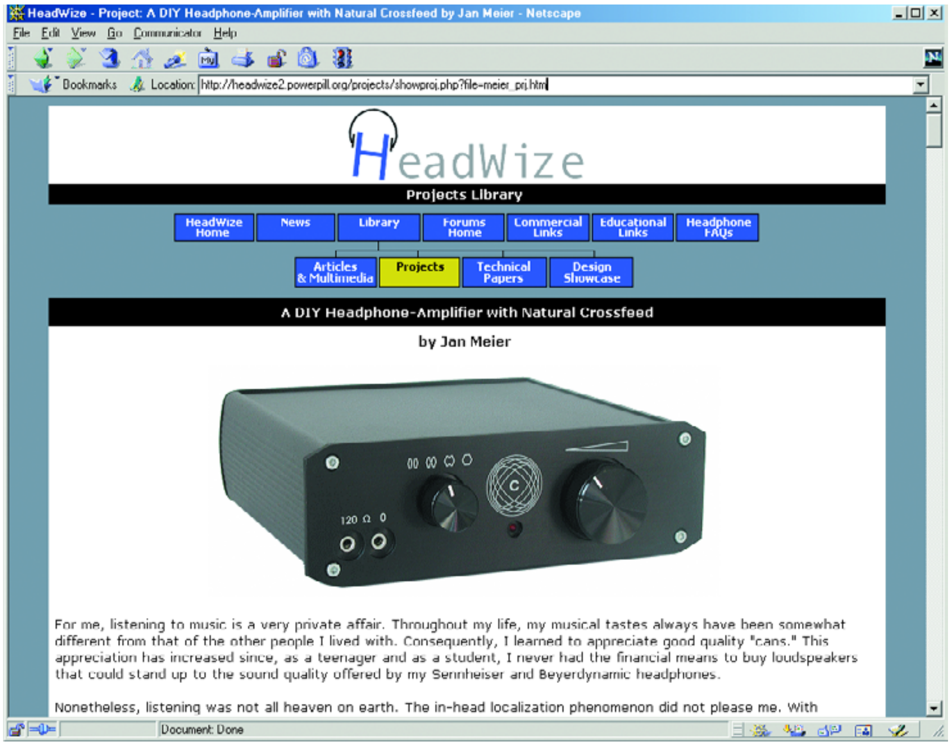
Headphone Amplifiers

DIY with valves and semiconductors

By Rolf Gerstendorf

Most commercial pre-amplifiers and power amplifiers have a headphones output. However, because of its simplicity the sonic quality of such an output is often judged as 'mediocre'. Optimum sound reproduction in a pair of expensive headphones requires a dedicated amplifier and these, unfortunately, are rarely seen in the highstreet hi-fi outlets. The Internet however offers many alternatives provided you are prepared to go for home construction.



HeadWize - Project: A DIY Headphone-Amplifier with Natural Crossfeed by Jan Meier - Netscape

http://headwize2.powerpill.org/projects/showproj.php?file=meier_prj.htm

HeadWize

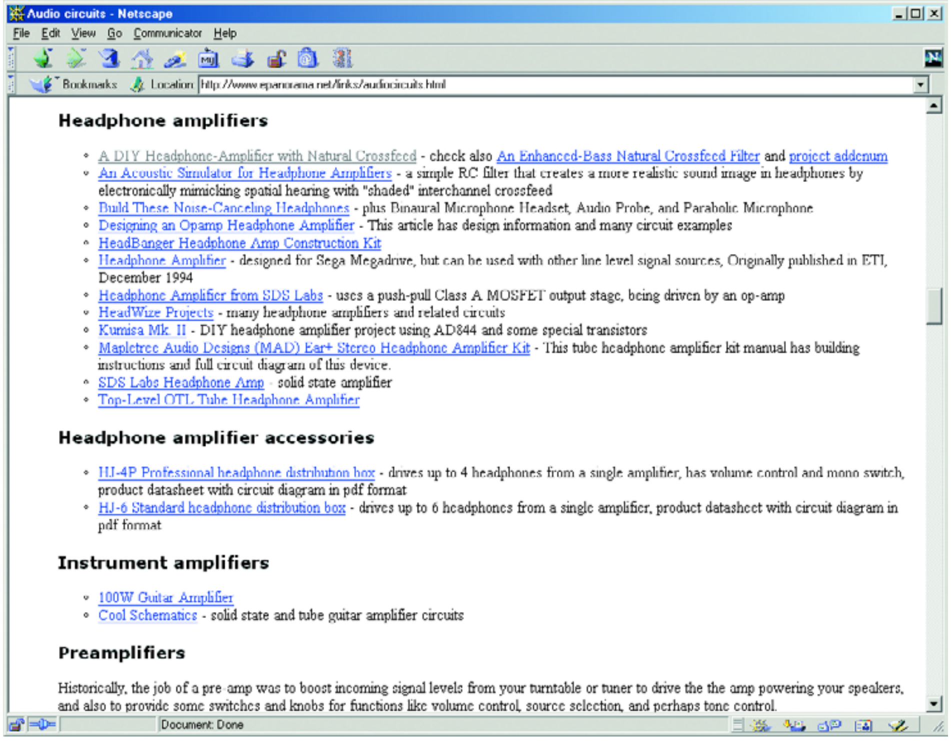
Projects Library

A DIY Headphone-Amplifier with Natural Crossfeed

by Jan Meier

For me, listening to music is a very private affair. Throughout my life, my musical tastes always have been somewhat different from that of the other people I lived with. Consequently, I learned to appreciate good quality "cans." This appreciation has increased since, as a teenager and as a student, I never had the financial means to buy loudspeakers that could stand up to the sound quality offered by my Sennheiser and Beyerdynamic headphones.

Nonetheless, listening was not all heaven on earth. The in-head localization phenomenon did not please me. With



Audio circuits - Netscape

http://www.epanorama.net/links/audiocircuits.html

Headphone amplifiers

- A DIY Headphone-Amplifier with Natural Crossfeed - check also An Enhanced-Bass Natural Crossfeed Filter and project addenum
- An Acoustic Simulator for Headphone Amplifiers - a simple RC filter that creates a more realistic sound image in headphones by electronically mimicking spatial hearing with "shaded" interchannel crossfeed
- Build These Noise-Canceling Headphones - plus Binaural Microphone Headset, Audio Probe, and Parabolic Microphone
- Designing an Opamp Headphone Amplifier - This article has design information and many circuit examples
- HeadBanger Headphone Amp Construction Kit
- Headphone Amplifier - designed for Sega Megadrive, but can be used with other line level signal sources, Originally published in ETI, December 1994
- Headphone Amplifier from SDS Labs - uses a push-pull Class A MOSFET output stage, being driven by an op-amp
- HeadWize Projects - many headphone amplifiers and related circuits
- Kumisa Mk. II - DIY headphone amplifier project using AD844 and some special transistors
- Mapletree Audio Designs (MAD) Ear+ Stereo Headphone Amplifier Kit - This tube headphone amplifier kit manual has building instructions and full circuit diagram of this device.
- SDS Labs Headphone Amp - solid state amplifier
- Top-Level OTL Tube Headphone Amplifier

Headphone amplifier accessories

- HJ-4P Professional headphone distribution box - drives up to 4 headphones from a single amplifier, has volume control and mono switch, product datasheet with circuit diagram in pdf format
- HJ-6 Standard headphone distribution box - drives up to 6 headphones from a single amplifier, product datasheet with circuit diagram in pdf format

Instrument amplifiers

- 100W Guitar Amplifier
- Cool Schematics - solid state and tube guitar amplifier circuits

Preamplifiers

Historically, the job of a pre-amp was to boost incoming signal levels from your turntable or tuner to drive the the amp powering your speakers, and also to provide some switches and knobs for functions like volume control, source selection, and perhaps tone control.

Many professional electronic engineers once started their 'career' with the construction of a headphone amplifier. This is not surprising, the circuits being relatively simple and requiring little theoretical knowledge of electronics. If you start trawling the Internet for circuit suggestions and feedback on published designs, it is harder to separate wheat from chaff than to find anything at all.

At the very lowest level the circuits usually have either a discrete amplifier or an opamp acting as an impedance converter with a volume control in front of it. The range continues, however, with far more extensive designs right up to high-end projects for electrostatic headphones. Surprisingly, friends of the valve have contributed a lot to the DIY headphone amplifier scene on the Internet.

An excellent place to start your search is Chu Moys **Headwize** website [1] which is home to many specialized forums, FAQ lists, links and so on. In the DIY section called **Projects** you will find nearly 100 (!) project suggestions for headphone amplifiers of various complexity and with documentation ranging from meagre to sumptuous.

Cable manufacturer RJM employs the DIY section of its website **RJM Audio Cable** [2] to present DIY headphone amplifiers and modifications to Headwize designs.

The **Black Widow Audio** website [3] supplies two construction projects. The circuit versions developed for the 'crossfeed' principle are well worth looking at.

Further interesting sites we came across are **Audio Pages** [4] and **Audiologica** [5]. The latter contains information on the META42 and MINT designs.

The **Wheatfield Audio** website at [6] has a surprise in store in that a commercial product is published for DIY construction, complete with schematics and PCB layouts.

Searching the **Epanorama** website at [7] for the argument 'headphone' produces a lot of links, not only to projects for home construction, but also two articles covering various subjects like headphone amplifier simulation, calculation tools and reviews of commercial kits. A similar collection of links is found on the **Innehall** site at [8].

On his website at [9] **Raymond van Weeghel** presents, among others, a headphone amplifier in hybrid technology. A valve is used in the prestage and a MOSFET in the output stage.

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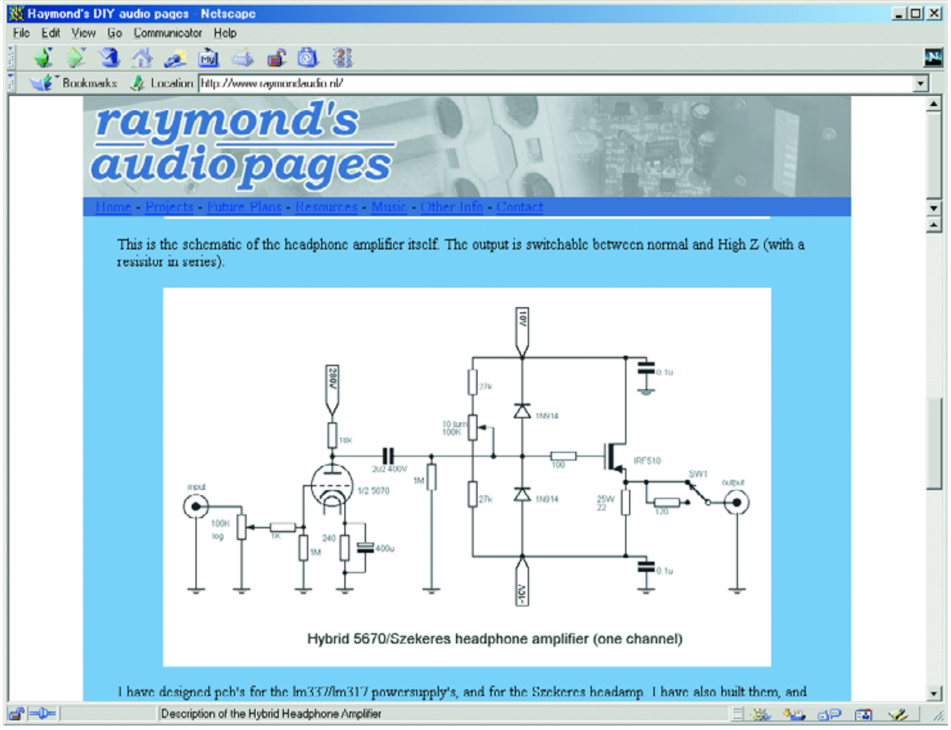


Raymond's DIY audio pages - Netscape

http://www.raymondaudio.nl/

raymond's audiopages

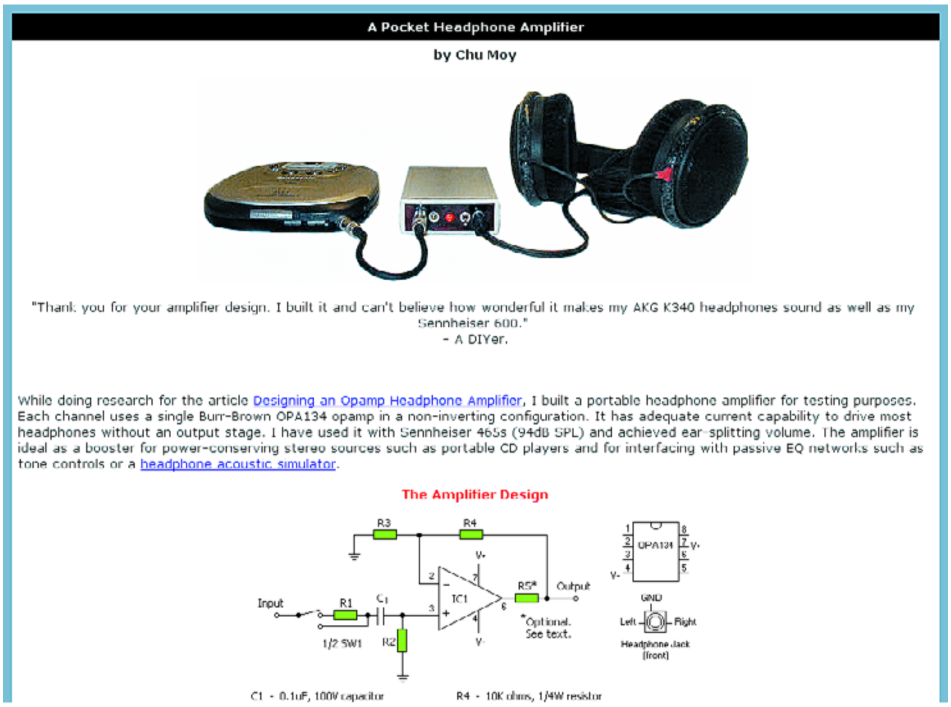
Home - Projects - Future Plans - Resources - Music - Other Info - Contact

This is the schematic of the headphone amplifier itself. The output is switchable between normal and High Z (with a resisitor in series).

Hybrid 5670/Szekeres headphone amplifier (one channel)

I have designed pcb's for the lm337/lm317 powersupply's, and for the Szekeres headamp. I have also built them, and

Description of the Hybrid Headphone Amplifier



A Pocket Headphone Amplifier

by Chu Moy

"Thank you for your amplifier design. I built it and can't believe how wonderful it makes my AKG K340 headphones sound as well as my Sennheiser 600."
- A DIYer.

While doing research for the article Designing an Opamp Headphone Amplifier, I built a portable headphone amplifier for testing purposes. Each channel uses a single Burr-Brown OPA134 opamp in a non-inverting configuration. It has adequate current capability to drive most headphones without an output stage. I have used it with Sennheiser 465s (94dB SPL) and achieved ear-splitting volume. The amplifier is ideal as a booster for power-conserving stereo sources such as portable CD players and for interfacing with passive EQ networks such as tone controls or a headphone acoustic simulator.

The Amplifier Design

C1 - 0.1uF, 100V capacitor

R4 - 10K ohms, 1/4W resistor

Web addresses:

[1] http://headwize2.powerpill.org/projects/showproj.php?file=meier_prj.htm
[2] www.geocities.com/rjm003.geo/rjmaudio/diy_hclo.html
[3] www.blackwidowaudio.com/index.htm
[4] http://sound.westhost.com/projects-1.htm
[5] http://tangentsoft.net/audio/
[6] www.pmillett.addr.com/ha-4_headphone_amp.htm
[7] www.epanorama.net/links/audiocircuits.html
[8] http://audionova.nu/Innehall/audionova_DIY_fr.htm
[9] www.raymondaudio.nl/